STATEMENT OF WORK
FOR
TREATABILITY STUDY
OF ULTRAFILTRATION/MICROFILTRATION PROCESSES
AT ROCKY FLATS PLANT

Prepared by:

Remediation Programs Division

EG&G, Rocky Flats Plant

July 15, 1991

Approved: _____ 15 JUL 91
Manager
Remediation Program Division

Reviewed for Classification
By _____
Date 7/15/91
SOW OK

"REVIEWED FOR CLASSIFICATION
By Tom C. Greengard
Date 7/15/91"

STATEMENT OF WORK
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1.0 OBJECTIVE

This statement of work describes the preparation of a Treatability Study Work Plan (TSWP) and performance of the tests described in this work plan for the treatability study of ultrafiltration/microfiltration processes for the removal of selected metals and radionuclides in surface and ground water at Rocky Flats Plant (RFP). The TSWP shall incorporate appropriate Standard Operating Procedures to provide a comprehensive work plan addressing all aspects of the treatability study. The treatability tests shall be implemented in accordance with the TSWP and the report shall be issued based on the results of these tests.

2.0 SCOPE

This TSWP shall provide and identify in detail the test objectives, data quality objectives, experimental procedures, treatability conditions to be tested, measurements of performance, analytical methods, data management and analysis, health and safety practices, and residual management.

The plan shall be written to completely describe all actions necessary to assure compliance with the Final Treatability Studies Plan (sitewide) and all appropriate guidance documents as well as Environmental Protection Agency/Colorado Department of Health requirements for Treatability Studies under CERCLA, the Interagency Agreement (IAG) and other regulatory requirements.

All treatability study tests shall be performed in accordance with the TSWP upon receipt of approval by the EPA/CDH. All the samples shall be analyzed in the subcontractor laboratories. If requested a duplicate sample will be sent for analysis to the analytical laboratories specified and approved by EG&G RFP. A Treatability Study Report (TSR) shall be issued when all the analytical results from the tests have been received. The TSR shall be written to completely describe all the activities performed, and compare the test results, and provide conclusions/recommendations for the future work.

3.0 BACKGROUND AND APPLICABLE DOCUMENTS

3.1 BACKGROUND

In June 1991 EG&G prepared a sitewide Final Treatability Study Plan

for the RFP and submitted this document to the Environmental Protection Agency (EPA) and Colorado Department of Health for their review and approval. No agency comments have been received on the Final Treatability Studies Plan however, they are expected during the term of this contract.

3.2 APPLICABLE DOCUMENTS

The following items will be furnished by EG&G RFP upon the subcontractors request after initial review of the data needs, and as required in preparation of this document:

The EPA guidance document "Guide for Conducting Treatability Studies under CERCLA" interim final 1989, which provides a comprehensive description of the requirements for the work plan preparation.

Final Treatability Studies Plan (sitewide), EG&G Rocky Flats Plant, June 3, 1991.

All relevant EG&G Standard Operating Procedures (SOP).

All other applicable RFP, local, state and Federal documents and guidance.

4.0 TECHNICAL REQUIREMENTS

4.1 The subcontractor shall provide a TSWP which shall include but not be limited to, coverage of the topics listed in this section of the Statement of Work and shall comply with the guidelines provided in the sitewide Final Treatability Studies Plan (EG&G RFP,June 3, 1991) and the EPA guidance document.

4.2 The subcontractor shall base the TSWP on the findings from the sitewide Treatability Studies Plan for the RFP.

4.3 The subcontractor shall describe within the TSWP the information provided in the Attachment #1.

4.4 The subcontractor shall prepare a plan which meets all regulatory requirements and consider all test objectives described in the Attachment #2.

4.5 The subcontractor shall prepare the TSWP as a final document for the actual treatability work which will begin upon receipt of EG&G, EPA, and CDH approval.

4.6 The subcontractor shall address and incorporate into the Work Plan all the comments received from the EG&G RFP, DOE RFO, and EPA/CDH.

4.7 All the samples will be collected by EG&G and shipped to the subcontractor facility for the tests and analysis. EG&G will use its own sampling protocol but subcontractor comments shall be

incorporated in this protocol prior to implementation unless these changes violate EG&G safety SOPs.

4.8 The subcontractor shall meet all quality assurance requirements described in the Attachment #3.

4.9 The subcontractor shall perform all tests described in the Final TSWP after all the comments have been incorporated. EG&G RFP, DOE RFO, EPA/CDH will have the right to observe the tests at any time during this performance. Prior to the beginning of this test the laboratory shall be audited and written reports shall be issued.

4.10 The subcontractor shall issue the TSR when all the analytical results are received back from the analytical laboratories. The subcontractor shall use EG&G RFP approved analytical laboratories for the final/confirmation set of tests. Suggested organization of the TSR is provided in the Attachment #4.

5.0 DELIVERABLES

The subcontractor shall deliver the Treatability Study Work Plan for review by EG&G at the 30% (draft #1) and 95% (draft #2) completion stages. Comments on each completion stage #1 and #2 Draft TSWP will be formally documented and submitted to the subcontractor for incorporation into Final Draft TSWP. The Final Draft Treatability Study Work Plan shall be submitted to EG&G RFP for delivery to the DOE RFO and EPA/CDH ten weeks from the award of the contract.

The subcontractor shall deliver the Draft Treatability Study Work Plan at the second completion stage (draft #2, 95% completed) to EG&G RFP eight weeks from the award of the contract.

The subcontractor shall submit an appendix to the work plan which shall include formal response to each EPA/CDH comment. The Final Treatability Study Work Plan reflecting all the changes shall be submitted to EG&G within two weeks of the time comments are received from the agencies.

The subcontractor shall furnish 4 copies of the draft #1 and #2 TSWP to EG&G Remediation Programs Division (RPD). This TSWP will be reviewed by EG&G and DOE. The subcontractor shall be responsible for participation in the meetings during the comment resolution period. After incorporation of DOE and EG&G comments, 20 copies of the draft TSWP shall be produced for the transmittal to DOE, EPA and CDH. Additional review meetings may be required. All meetings shall be approved by the EG&G Project Manager. Transmittal of all documents to EG&G shall be recorded in memos, meeting minutes, or transmittal letters by the subcontractor.

The subcontractor shall be responsible for the preparation of the meeting minutes. The typed minutes are due to the EG&G RFP/Remediation Programs Division project manager within one week of the meeting date. A schedule for the comment resolution will be finalized and agreed upon after receipt of comments from the agencies.

The subcontractor shall provide Monthly Contract Status Reports as outlined in the Attachment #5 to the project manager and Resource Information Management Department of Environmental Management by the 20-th of each month during the contract period.

The subcontractor shall perform all the tests identified in the TSWP within three to four months from the time of the TSWP approval. The TSWP shall identify a time limit for the tests performance reflecting content of the test work and comments on the TSWP.

The time frame for delivery of the TSR draft copy shall be specified in the TSWP however, it shall not exceed time for the preparation of TSWP (ten weeks) from the time all analytical results received from analytical laboratories.

The subcontractor proposal with any contractor or EG&G mandated changes, shall be considered part of this Statement of Work after the proposal has been accepted. This SOW will be revised to reflect any changes as necessary.

ATTACHMENT #1

INFORMATION TO BE INCLUDED IN THE TSWP

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Attachment #1:
INFORMATION TO BE INCLUDED IN THE TSWP

Executive Summary - This section shall briefly summarize the conclusions of the TSWP.

Introduction - This section shall consist of an introduction discussing the purpose and goals of the treatability study.

Table of Acronyms - This shall consist of a table(s) describing all the acronyms, abbreviations, and nomenclature used in the TSWP.

Project Description - This report section shall consist of site background information and shall include a brief description of the location of site, site geology and hydrogeology, site meteorology, site climatology and other site characteristics that can potentially effect the remediation methodology and implementation.

A brief description of the contaminants shall also be included. This description shall include information on all identified contaminants including contaminant descriptions, suspected contaminant sources, and contaminant distributions. A description of treatment goals with the Applicable or Relevant Appropriate Requirements (ARAR).

Remedial Technology Description - A brief description of the technologies to be tested shall be included in the main text of the TSWP.

Test Objectives - A description of test objectives shall be written explaining the purpose of the treatability test including a delineation of the relationship of the treatability study to the Inter-Agency Agreement (IAG) and the Feasibility Study, remedial action, and existing regulations. A brief description of the data to be collected and instructions for the use of this data for the evaluation of the technology shall be included in the TSWP.

Experimental Design and Procedures - A detailed step-by-step description of each experimental procedure for each test shall be incorporated into the TSWP.

Equipment and Materials - This shall include specific information about the equipment and materials to be used during the treatability study, especially if unique materials and equipment are planned to be used.

Data Management - This shall describe the methodology of documenting observations as well as for recording raw data. This section shall also discuss the handling of proprietary information.

Data Analysis and Interpretation - This section shall describe the procedures for the use of the data analysis, evaluation,

interpretation, and shall include statistical methods of the data analysis.

Residual Management - This section shall discuss the disposition of residual materials including the type and quantity of residuals expected, the impact that the residuals will have on the budget and schedule, the analysis needed to characterize those residuals, and the transportation and disposition of those residuals.

Reports - This section shall include a description of the Treatability Study Report (TSR). Further details on the TSR can be found in the sitewide Final Treatability Studies Plan. This section shall also describe the monthly progress reports which will be done during the treatability study tests.

Schedule - A schedule shall be included in the TSWP presenting all aspects of the field sampling, laboratory testing, and the TSR preparation and submittal.

Management and Staffing - This section shall identify key management and personnel. The line of authority shall be delineated in the organizational chart.

Budget - This section shall include the projected costs for completing of all tasks proposed by the TSWP.

References - This section shall contain the list of all the documents used during the preparation of the TSWP.

Field Sampling and Analysis Plan(FS&AP) - This section shall be prepared as an appendix to the TSWP. This plan shall present the details on sampling location and frequency; sampling equipment and procedures on how the sampling is going to be performed., sample designation, handling, shipping, and documentation procedures; and analytical methods.

Health and Safety Plan(HSP) - Shall be prepared as an appendix to the TSWP. The HSP shall include descriptions of staff organization, work activities, hazard assessment, general and site-specific health and safety requirements, emergency procedures, safety documentation procedures and residual handling procedures. The HSP shall cover all phases of the project: in the field and in the testing laboratory.

ATTACHMENT #2
CLARIFICATION OF THE TREATABILITY STUDY OBJECTIVES

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Attachment #2:
Clarification of the Treatability Study Objectives

The primary objectives of this Treatability Study test is to provide proof of principle that ultrafiltration and/or microfiltration are viable candidates for the removal of Plutonium and Americium from the seeps and alluvial ground waters at RFP. The secondary objective is to demonstrate similar proof of the principle for metals list of which shall be identified in the treatability study work plan. The use of chelating agents to assist in the removal of metals will be investigated to the level of identifying viable chelating agents and ranking their relative effectiveness. The removal efficiencies achieved by filtration shall be determined during the treatability study tests.

The test program shall use small bench scale tests to chelate the metals and radionuclides and filter the chelated contaminants for the water using microfiltration or ultrafiltration membranes. Initial testing shall involve multiple jar tests using all potentially applicable chelating agents at the estimated best dose and at a number of different pH levels. These samples shall be filtered and the filtrate shall be analyzed for metals and radionuclides.

It is intended that membranes for this tests be selected from those that are commercially available. However, the subcontractor shall review membranes that are presently in the developmental stage and test one such membrane if it is considered to be a potential improvement in this application.

Four chelating agents which produced the best removals during the initial tests shall be subjected to a second round of testing . The most effective dosage of chelating agent and operating pH shall be established during this second round of tests.

The treatability tests shall be supported by appropriate characterization information that is necessary for understanding the states of the contaminants before and after treatment and also to aid in the selection of membranes. Characterization of the untreated water shall be expanded to achieve physical and chemical colloidal characterization in the surface and ground water. Colloidal characterization shall be described separately in the TSWP.

It is intended that the information from these laboratory scale tests will be used to determine if bench and or pilot scale tests are to be carried out and if so, to provide data which will support the design of same.

ATTACHMENT #3

QUALITY ASSURANCE REQUIREMENTS

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Attachment #3:
Quality Assurance Requirements

Work performed under this SOW, specifically activities including the preparation of data, technical documents and reports, is directed by the EG&G Environmental Management (EM) Quality Assurance Program Description (QAPD). The EM QAPD complies with the requirements of DOE Order 5700.6B which addresses ASME NQA-1. The contractor is required to comply with the following specific Quality Assurance (QA) requirements:

Quality Assurance Addendum - After review of the draft TSWP, EG&G will prepare a Quality Assurance Addendum that will be submitted with the TSWP to the EPA/CDH.

Organization - The authority and responsibilities of persons or organizations performing technical work under this statement of work shall be established, documented and submitted to EG&G.

Personnel Qualification - Personnel performing technical work affecting quality shall receive sufficient training and indoctrination to assure proper understanding of the QA and technical requirements of this SOW before beginning quality affecting work. In addition, written personnel qualification requirements shall be established for all positions performing technical work affecting quality. Documented evidence of personnel training, training material content, personnel qualification requirements, and the qualification of personnel who meet the personnel qualification requirements shall be maintained and made available to EG&G for review upon request.

Design - Activities involving the performance of technical design related activities, specifically, but not limited to, calculations used in developing data and calculations incorporated into reports, shall be verified and documented. This documentation shall be submitted, along with the associated project deliverables, to EG&G with the final version of the applicable deliverable(s).

Document Control - Activities involving the acquisition, preparation, review, approval and issuance of documents which affect, or have the potential to affect quality, shall be controlled and documented. Documented evidence of contractor's internal review and approval shall be submitted to EG&G along with the final revision of the applicable deliverables.

Control of Nonconforming Items - Controls for the identification and disposition of nonconforming items shall be utilized. These controls, including the notification of EG&G, will apply to the handling of all items, including samples, data, raw materials, hardware, and software.

Corrective Actions - Controls to identify, rectify and preclude recurrence of conditions adverse to quality shall be established and utilized. Such conditions are to be promptly identified and corrected by authorized personnel. The root cause of conditions adverse to quality shall be determined and corrected to prevent recurrence. Corrective Actions shall be documented and EG&G shall be notified of such actions.

Software Quality Assurance - Activities involving the development and use of both administrative and scientific computer software which have a potential to affect quality shall be controlled under a procedure to control the development, documentation, and use of such software.

EG&G verification activities shall not relieve the contractor of responsibility for verification of quality achievement.

The vendor's workplace and EG&G records shall be accessible to EG&G personnel, or their representatives, during the performance of this contract.

ATTACHMENT #4

SUGGESTED ORGANIZATION OF THE
TREATABILITY STUDY REPORT

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SUGGESTED ORGANIZATION OF THE TREATABILITY STUDIES REPORT[1]

1. Introduction
   - 1.1 Site description
     - 1.1.1 Site name and location
     - 1.1.2 History of operations
     - 1.1.3 Prior removal and remediation activities
   - 1.2 Waste stream description
     - 1.2.1 Waste matrices
     - 1.2.2 Pollutants/chemical
   - 1.3 Remedial technology description
     - 1.3.1 Treatment process and scale
     - 1.3.2 Operating features
   - 1.4 Previous treatability studies at the site

2. Conclusions and Recommendations
   - 2.1 Conclusions
   - 2.2 Recommendations

3. Treatability Study Approach
   - 3.1 Test objectives and rationale
   - 3.2 Experimental design and procedures
   - 3.3 Equipment and materials
     - 3.4.1 Waste stream
     - 3.4.2 Treatment process
   - 3.5 Data management
   - 3.6 Deviations from the work plan

4. Results and Discussion
   - 4.1 Data analysis and interpretation
     - 4.1.1 Analysis of waste stream characteristics
     - 4.1.2 Analysis of treatability study data
     - 4.1.3 Comparison to test objectives
   - 4.2 Quality assurance/quality control
   - 4.3 Costs/schedule for performing the treatability study
   - 4.4 Key contacts

References

Appendices
- A. Data summaries
- B. Standard operating procedures

[1] EPA Guide for Conducting Treatability Studies Under CERCLA (U.S. EPA 1989b)

ATTACHMENT #5

REPORTING FORMAT

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REPORTING FORMAT

Contract Number:	(Number associated with this D.O.)
Name:	(Title associated with D.O.)
Award Date:	(Date you were awarded D.O.)
Expiration Date:	(Date after which D.O. and modifications expires)
Contract Funding:	
(1) Initial finding:	(Initial dollar amount)
(2) Modifications:	(Total modifications)
(3) Ceiling:	(Total contract amount)
Invoiced Costs:	(Total amount invoiced to date)
Date of Last Invoice:	(Date you submitted last invoice)
Amount Expended This Period:	(Total including labor, material, subcontractors, etc. through the end of the previous month. This amount should reflect all estimated costs, even though uninvoiced to you.)
Total Amount Expended:	(Include all invoiced and all uninvoiced through the entire period)
Estimated Percent Completion:	(Your best estimate of the portion of all tasking which is complete)
Status:	(Maximum of two short paragraphs explaining status. Any detailed explanations should be addressed separately as an ongoing operational matter.)

ATTACHMENT #6

COST ESTIMATE

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Attachment #5:
Cost Estimate

* All status/review meetings or work sessions for the treatability study work plan will be conducted at contractor facilities.

* Contractor will be responsible for delivering documents to EG&G

TABLE: COST ESTIMATE

Task	Estimate $ Amount
Contractor:	
Management	2,000
Overhead	3,000
Other Direct Cost	1,000
Subcontractor:	
Management	8,000
Work sessions/Meetings	7,000
Work Plan	50,000
Other Direct Cost	10,000
Health and Safety Plan	5,000
Sampling Plan	5,000
Fee subcontractor (10%)	9,000
Perform Colloidal study	100,000
Perform Treatability Study	100,000
Perform Analytical Work	100,000
Write report on the findings	100,000
Total	500,000

Estimated Amount to be spent in FY 91 is $50,000 the rest of the funds should come out of FY 92 budget.